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NATIONAL BUREAU OF STANDARDS REPORT

6896

EUROPEAN PRODUCTIVITY AGENCY

MEETING OF EXPERTS ON USE OF MODELS FOR

STUDY OF FIRE EXTINCTION

by

A. F. Robertson

NBS

U. S. DEPARTMENT OF COMMERCE

NATIONAL BUREAU OF STANDARDS

THE NATIONAL BUREAU OF STANDARDS

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ABSTRACT

A meeting was held at Charles House of D. S. I. R. in London on 2nd June for the purpose of discussing the feasibility of an International co-operative study of the use of water for extinction of fires in rooms. The desirability of such a study was generally accepted and agreed upon. However, it was considered desirable that preliminary experiments be carried out at the Joint Fire Research Station in Britain to better define the variables to be studied prior to initiation of the co-operative tests.

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1. Introduction

During the last meeting, in September 1959, of this group, it was recommended that discussions be held on the feasibility of conducting co-operative studies on the extinction of fires with water. The present meeting was held in the offices of D. S. I. R. London on June 2nd 1960.

The introduction was made by Col. Fackler, the Chairman of the E. P. A. Committee on Applied Research, Working Commission on Fire Research. He reviewed the objectives of E. P. A. in encouraging co-operative work in N. A. T. O. countries. He suggested that this first meeting to discuss the planning of an active co-operative research study might indicate the direction in which the Committee's activities would progress. He suggested that Mr. Lawson assume the position of Chairman for this meeting.

Mr. Lawson pointed out that at least 40 per cent of all fires attended by brigades were controlled without use of major equipment. These fires were usually of such a nature that extinction problems were not of major concern and joint study of them did not seem worth while. On the other hand there were a group of fires which got out of hand and presented a serious fire fighting problem. It was proposed that the discussions of the day would be concerned with them and studies of ways in which models could be used to indicate ways in which water could be more effectively used for fighting large fires. In presenting Mr. Hird of the Joint Fire Research Station Mr. Lawson suggested that three questions be considered:

1. Was the proposed study worth doing?

2. Was the method of study suggested the proper one?

3. How could a co-operative study best be implemented?

2. Presentation at Meeting

Mr. Hird briefly summarized the development of fire with respect to the behavior of the fuel. He suggested that there were three rather well defined stages:

1. Heating of the fuel to the point of flashover;

2. Gradual development of fire involving deepening of char; and

3. Depletion of fuel supply and cooling of ashes.

He suggested that more than 40 per cent of the fires were controlled in the first stage and we were only concerned with those more fully developed in Stage 2. He proposed a study with the use of models, perhaps very similar to those involved in the C.I.B. study, of the quantity of water required for suppression of fires after reaching the stage of flashover.

There was some general discussion at this stage. Mr. Eggink suggested that 60 - 70 per cent of fires were extinguished before flashover, while the very large fires usually result in total loss. Hird agreed that only in about 20 per cent of all fires was major equipment required. Dr. Magnus suggested emphasis on the scientific problem. He said that the proposed study would show the minimum rate of water application for the fuel arrangement involved. Other application methods or fuel dispersions would require more water. He pointed out that the Vienna Fire Department had kept careful records of fire, fuel size and character vs water required for control of fires during the period between the wars.

Lawson indicated British experience showed that water was used at the rate of about 170×10^6 gal/sq. mile of fire.

Dr. van Hoogstraten suggested that one of the results of the study might be a reduction of the amount of water damage. In many cases more severe water than fire damage was observed.

All the delegates agreed in principle with the desirability of the study and the suggestion that in performing the extinguishment trials they should be started after flashover had occurred.

The variables to be studied and the method of experiment were discussed by both Mr. Hird and Dr. Scott. In general the points covered were very similar to those presented on pages 4 to 2 of EPA/AR/1787. Dr. Scott emphasized that before the experiments could be started preliminary experiments would be necessary to define the manner in which measurements could be made. She suggested the need for measurements of both the time of control as well as the time of extinction. It was not clear how this would be accomplished in a single experiment. Dr. Magnus suggested that the time of control be taken as the time at which rate of weight change was reduced to zero. It was suggested that the study should be started on a co-operative basis in about one year's time. A poll was taken of the delegates to determine their possible interest in participating. In general all delegates indicated an interest in co-operating to the extent possible.

A review was then presented of the paper "The use of High and Low Pressure Water Sprays against Fully Developed Room Fires". F. R. Note 388 of March 1959. This study seemed to show that the effectiveness of water sprays for control of fires in a room was insensitive to variations of water supply pressure.

3. Discussion and Recommendations

Following, as it did, three days of meetings of the C.I.B. group during which over thirty papers were presented, this meeting with its discussion of two papers seemed rather a let-down. From discussions with several delegates it seems that there are several who would prefer to see the two groups merged (C.I.B. and E.P.A.). However, there appears to be some reluctance in both parent groups towards such a merger of the fire research groups. While the objectives of the E.P.A. group appear well worth while, it does not appear desirable to encourage our attendance through special trips to further meetings of this group when discussions of such limited scope are planned.

DELEGATES IN ATTENDANCE AT E. P. A. MEETING

2nd May 1960

FRANCE:	Col. Fackler	Chairman
BRITAIN:	D. I. Lawson	Acting Chairman
	J. F. Fry	Secretary
	D. Hird	
	Dr. Scott	
	Dr. Kingman	
NETHERLANDS:	Dr. van Hoogstraten	
	Ir. W. Eggink	
AUSTRIA:	Dr. Rister	
GERMANY:	Dr. Magnus	
	Mr. Roux	
ITALY:	General Piermarine	
	Mr. Cuomo	
SWEDEN:	P. A. Johannesson	
CANADA:	Mr. G. Shorter	
	Mr. R. Leggett	

U.S. DEPARTMENT OF COMMERCE
Frederick H. Mueller, *Secretary*

NATIONAL BUREAU OF STANDARDS
A. V. Astin, *Director*

THE NATIONAL BUREAU OF STANDARDS

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WASHINGTON, D.C.

Electricity and Electronics. Resistance and Reactance. Electron Devices. Electrical Instruments. Magnetic Measurements. Dielectrics. Engineering Electronics. Electronic Instrumentation. Electrochemistry.

Optics and Metrology. Photometry and Colorimetry. Photographic Technology. Length. Engineering Metrology.

Heat. Temperature Physics. Thermodynamics. Cryogenic Physics. Rheology. Molecular Kinetics. Free Radicals Research.

Atomic and Radiation Physics. Spectroscopy. Radiometry. Mass Spectrometry. Solid State Physics. Electron Physics. Atomic Physics. Neutron Physics. Radiation Theory. Radioactivity. X-rays. High Energy Radiation. Nucleonic Instrumentation. Radiological Equipment.

Chemistry. Organic Coatings. Surface Chemistry. Organic Chemistry. Analytical Chemistry. Inorganic Chemistry. Electrodeposition. Molecular Structure and Properties of Gases. Physical Chemistry. Thermochemistry. Spectrochemistry. Pure Substances.

Mechanics. Sound. Mechanical Instruments. Fluid Mechanics. Engineering Mechanics. Mass and Scale. Capacity, Density, and Fluid Meters. Combustion Controls.

Organic and Fibrous Materials. Rubber. Textiles. Paper. Leather. Testing and Specifications. Polymer Structure. Plastics. Dental Research.

Metallurgy. Thermal Metallurgy. Chemical Metallurgy. Mechanical Metallurgy. Corrosion. Metal Physics.

Mineral Products. Engineering Ceramics. Glass. Refractories. Enameled Metals. Constitution and Microstructure.

Building Technology. Structural Engineering. Fire Protection. Air Conditioning, Heating, and Refrigeration. Floor, Roof, and Wall Coverings. Codes and Safety Standards. Heat Transfer. Concreting Materials.

Applied Mathematics. Numerical Analysis. Computation. Statistical Engineering. Mathematical Physics.

Data Processing Systems. SEAC Engineering Group. Components and Techniques. Digital Circuitry. Digital Systems. Analog Systems. Application Engineering.

• Office of Basic Instrumentation.

• Office of Weights and Measures.

BOULDER, COLORADO

Cryogenic Engineering. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Gas Liquefaction.

Radio Propagation Physics. Upper Atmosphere Research. Ionospheric Research. Regular Propagation Services. Sun-Earth Relationships. VHF Research. Radio Warning Services. Airglow and Aurora. Radio Astronomy and Arctic Propagation.

Radio Propagation Engineering. Data Reduction Instrumentation. Modulation Research. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation Obstacles Engineering. Radio-Meteorology. Lower Atmosphere Physics.

Radio Standards. High Frequency Electrical Standards. Radio Broadcast Service. High Frequency Impedance Standards. Electronic Calibration Center. Microwave Physics. Microwave Circuit Standards.

Radio Communication and Systems. Low Frequency and Very Low Frequency Research. High Frequency and Very High Frequency Research. Ultra High Frequency and Super High Frequency Research. Modulation Research. Antenna Research. Navigation Systems. Systems Analysis. Field Operations.

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